

**PATENT COOPERATION TREATY**  
**PCT**  
**INTERNATIONAL PRELIMINARY EXAMINATION REPORT**  
(PCT Article 36 and Rule 70)

Applicant's or agent's file reference WO1705HGC	<b>FOR FURTHER ACTION</b>	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/JP 03/13472	International filing date (day/month/year) 22.10.2003	Priority date (day/month/year) 25.10.2002
International Patent Classification (IPC) or both national classification and IPC B23P19/06		
Applicant HONDA MOTOR CO., LTD.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
  
2. This REPORT consists of a total of 6 sheets, including this cover sheet.
  - This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.
  
3. This report contains indications relating to the following items:
  - I     Basis of the opinion
  - II    Priority
  - III    Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
  - IV    Lack of unity of invention
  - V    Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
  - VI    Certain documents cited
  - VII    Certain defects in the international application
  - VIII    Certain observations on the international application

Date of submission of the demand  03.03.2004	Date of completion of this report  26.10.2004
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Plastiras, D Telephone No. +31 70 340-2543



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**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-41 as originally filed

**Claims, Numbers**

1, 3-6 received on 27.09.2004 with letter of 22.09.2004

**Drawings, Sheets**

1/22-22/22 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description, pages:
- the claims, Nos.: 2
- the drawings, sheets:

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5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).  
*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1,3-6
	No: Claims	
Inventive step (IS)	Yes: Claims	1,3-6
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1,3-6
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

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**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Reference is made to the following documents:**

D1: PATENT ABSTRACTS OF JAPAN vol. 1998, no. 01, 30 January 1998 -& JP 09 254044 A (MEISHO KK), 30 September 1997  
D2: EP-A-0 348 282 (RENAULT AUTOMATION) 27 December 1989  
D3: PATENT ABSTRACTS OF JAPAN vol. 016, no. 440 (M-1310), 14 September 1992 -& JP 04 152033 A (YOSHITAKA AOYAMA), 26 May 1992

**2.1 The document D1 (see abstract; figures) is regarded as being the closest prior art to the subject-matter of claim 1 and discloses (the references in parentheses applying to this document):**

An apparatus for tightening a threaded member, comprising:

a screwing mechanism including a rotational shaft (12) and a threaded engagement member (11) threadedly engaging an outer periphery of the rotational shaft (12);

an axial movement means (4) provided to one of the rotational shaft (12) and the threaded engagement member (11) for axially moving to rotate the rotational shaft (12);

a shaft member (3a) provided to the rotational shaft and capable of rotating in unison with the rotational shaft (*in document D1 this shaft member (3a) is integral with rotational shaft (12)*);

a socket portion (18) provided to one end of the shaft member for receiving therein the threaded member in such a manner as to transmit the rotation of the shaft member (3a) to the threaded member (12); and

a retention means (*shaft 3a being magnetisable is considered as constituting the retention means-see figures 8 and 9*) for retaining the threaded member (5) received in the socket portion (18) or the threaded member (5) released from the socket portion (18) .

The apparatus of claim 1 therefore differs from this known apparatus in that:

the shaft member (20) is hollowed to define a space therein and that

the retention means (22) comprises a rod (50) axially movably disposed within the space of the shaft member (20) and having a lower end (51) positioned

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in a vicinity of the socket portion (21),

a magnet (53) is provided at the lower end (51) of the rod (50) for magnetically holding a head of the threaded member (13) to thereby retain the threaded member (18) within the socket portion (18),

a compression spring (63) disposed on the shaft member (20) for urging the magnet (53) to an attracting position in which the threaded member (13) is magnetically held by the magnet (53), and

a moving means (71) for moving the rod against the urging force of the spring (63) to cause the magnet (53) to move away from the attracting position to thereby release the threaded member(13) from the socket portion (18).

The combination of features of claim 1 enables a reliable pre-tightening of a bolt. More specifically the release of the head 14 of the bolt 13 from the magnet 53 helps the socket portion 21 move away from the head 14 of the bolt 13 as soon as the shaft member 20 is moved upwardly.

It thus becomes possible to move the socket portion 21 away from the bolt 13 by rotating the bolt 13 counterclockwise through only few degrees and thus the bolt 13 having undergone the temporary tightening operation remains screwed into the aperture 12 by the distance of the one to triple pitches.

Document D2 discloses a tightening apparatus comprising a screwing mechanism including a rotational shaft, a threaded engagement member, a shaft member provided to the rotational shaft and a socket portion as stated in the preamble of the claim but it does not disclose any retention means.

Document D3 discloses the use of retention means comprising a rod, a magnet compressed by compression spring and a moving member for disengaging the magnet from the bolt in a feeding apparatus for bolts. In this document no features of a tightening apparatus as presented in the preamble of claim 1 are disclosed.

The combination of features of claim 1 is not disclosed or suggested in the available prior art.

Hence the subject matter of claim 1 meets the criteria of Articles 33(2) and 33(3) PCT regarding novelty and inventive step.

**2.2** Claims 3 and 4 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

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**2.3** The document D1 (see abstract; figures) is regarded as being the closest prior art also to the subject-matter of claim 5 and discloses:

An apparatus for tightening a threaded member to a workpiece, the apparatus comprising:

- a screwing mechanism including a rotational part and a threaded engagement member threadedly engaging the rotational part;
- an axial movement means for axially moving to move the threaded engagement member axially of the rotational part to rotate the rotational part;
- a shaft member provided to the rotational part the shaft member capable of rotating in unison with the rotational part;
- a socket portion provided to one end of the shaft member for receiving therein the threaded member in such a manner as to transmit the rotation of the shaft member to the threaded member; and
- a retention means for retaining the threaded member received in the socket portion and retaining the threaded member released from the socket portion.

The apparatus of claim 5 therefore differs from this known apparatus in that:

- it comprises an automatic robot arm (16);
- the screwing mechanism (102) is provided to the automatic robot arm (16);
- the shaft member (106) is axially movably provided to the rotational part (104) via a slide part (105) slideable relative to the rotational part (104);
- an urging means (107) is provided for urging the shaft member (106) in a direction away from the rotational part (104);

The apparatus according to claim 1 can be used for pre-tightening and final tightening of the bolt.

The combination of features of claim 5 is not disclosed or suggested in the available prior art.

Hence the subject matter of claim 5 meets the criteria of Articles 33(2) and 33(3) PCT regarding novelty and inventive step.

**2.4** Claim 6 is dependent on claim 5 and as such also meets the requirements of the PCT with respect to novelty and inventive step.

EPO - DG 1

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CLAIMS

27.09.2004

(52)

1. (amended) An apparatus for tightening a threaded member, comprising: a screwing mechanism including a rotational shaft and  
5 a threaded engagement member threadedly engaging an outer periphery of the rotational shaft; an axial movement means provided to one of the rotational shaft and the threaded engagement member for axially moving to rotate the rotational shaft; a shaft member provided to the rotational shaft and capable of rotating in unison  
10 with the rotational shaft, the shaft member being hollowed to define a space therein; a socket portion provided to one end of the shaft member for receiving therein the threaded member in such a manner as to transmit the rotation of the shaft member to the threaded member; and a retention means for retaining the threaded member  
15 received in the socket portion or the threaded member released from the socket portion,

wherein the retention means comprises a rod axially movably disposed within the space of the shaft member and having a lower end positioned in a vicinity of the socket portion, a magnet provided  
20 at the lower end of the rod for magnetically holding a head of the threaded member to thereby retain the threaded member within the socket portion, a compression spring disposed on the shaft member for urging the magnet to an attracting position in which the threaded member is magnetically held by the magnet, and a moving  
25 means for moving the rod against the urging force of the spring to cause the magnet to move away from the attracting position to thereby release the threaded member from the socket portion.

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2. (canceled)

3. An apparatus according to claim 1, wherein the shaft member is pivotally connected to the rotational shaft.

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4. An apparatus according to claim 1, wherein the axial movement means is an automatic robot arm axially movable to rotate the rotational shaft.

10 5. (amended) An apparatus for tightening a threaded member to a workpiece, the apparatus shuttling between the workpiece and a supplying section at which the apparatus is supplied with the threaded member, the apparatus comprising:

an automatic robot arm;

15 a screwing mechanism provided to the automatic robot arm and including a rotational part and a threaded engagement member threadedly engaging the rotational part;

an axial movement means for axially moving to move the threaded engagement member axially of the rotational part to rotate  
20 the rotational part;

a shaft member axially movably provided to the rotational part via a slide part slidable relative to the rotational part, the shaft member capable of rotating in unison with the rotational part;

25 an urging means for urging the shaft member in a direction away from the rotational part;

a socket portion provided to one end of the shaft member

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for receiving therein the threaded member in such a manner as to transmit the rotation of the shaft member to the threaded member; and

5 a retention means for retaining the threaded member received in the socket portion and retaining the threaded member released from the socket portion.

6. An apparatus according to claim 5, wherein the axial movement means moves axially to rotate the rotational part in either one 10 direction to tighten the threaded member to the workpiece or the opposite direction to loosen the threaded member out of the workpiece.